## 2.1

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & 1 & 0 \\ 2 & -1 & 1 \\ 3 & 2 & 4 \end{bmatrix}$$

$$3 \times 3 \qquad\qquad 3 \times 3$$

$$AB \quad , \quad BA \; : \quad 3 \times 3$$

Indgang $(2,2)$ i $AB =$

$$\begin{bmatrix} 4 & 5 & 6 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix} = 4 \cdot 1 + 5 \cdot (-1) + 6 \cdot 2 = 11$$

Indgang $(2,2)$ i $BA$ =

$$\begin{bmatrix} 2 & -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 \\ 5 \\ 8 \end{bmatrix} = 2 \cdot 2 + (-1) \cdot 5 + 1 \cdot 8 = 7$$

$$AB \neq BA$$

<u>Regneregler:</u>

$$(AC)^T = C^T A^T$$

Indgang $(i, j)$ i $C^T A^T$:

$(C^T$ række $i) \cdot (A^T$ søjle $j) =$

$(C$'s søjle $i) \cdot (A$'s række $j) =$

$(A$'s række $j) \cdot (C$'s søjle $i) =$

indgang $(j, i)$ i $AC =$

indgang $(i, j)$ i $(AC)^T$

## 2.8

$T: \mathbb{R}^n \to \mathbb{R}^m$ linear transformation

med standardmatrix $A$ : $m \times n$

$U: \mathbb{R}^m \to \mathbb{R}^p$ linear transformation

med standardmatrix $B$ : $p \times m$

$\vec{v}$ : vektor i $\mathbb{R}^n$

$T(\vec{v}) = A\vec{v}$ vektor i $\mathbb{R}^m$

$U(T(\vec{v})) = (U \circ T)(\vec{v})$ vektor i $\mathbb{R}^p$.

Skrives $U \circ T = UT : \mathbb{R}^n \to \mathbb{R}^p$

$$(UT)(\vec{v}) = U(T(\vec{v})) = U(A\vec{v}) = B(A\vec{v})$$

$$(BA)\vec{v}$$

$BA$: $p \times n$ matrix: standardmatrix for $UT$

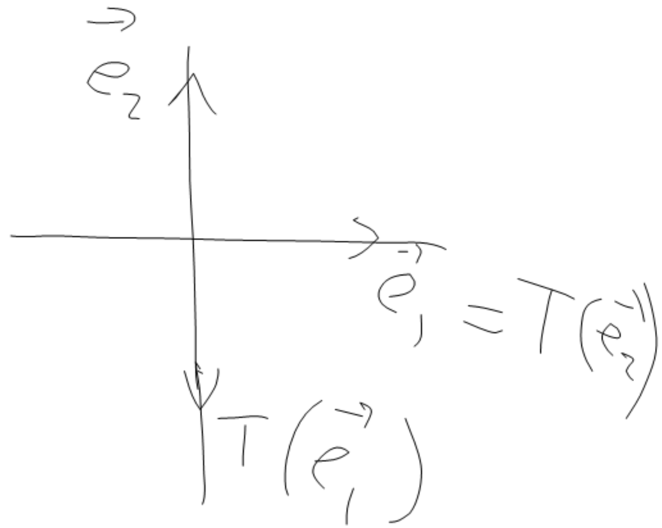
EKS:

$T: \mathbb{R}^2 \to \mathbb{R}^2$ rotation $-90^\circ$ omkring $(0,0)$

$U: \mathbb{R}^2 \to \mathbb{R}^2$ spejling om $x$-aksen

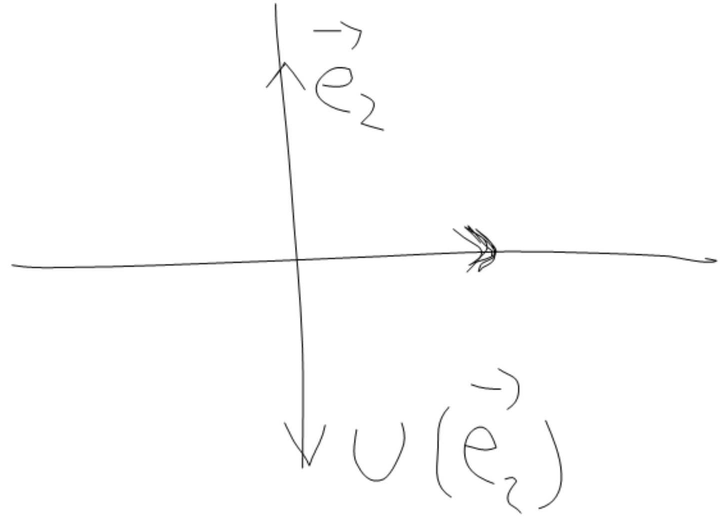
Standardmatrix for $T$:

$$A = \begin{bmatrix} T(\vec{e}_1) & T(\vec{e}_2) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$




Standard matrix for $U$:

$$B = \begin{bmatrix} U(\vec{e}_1) & U(\vec{e}_2) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

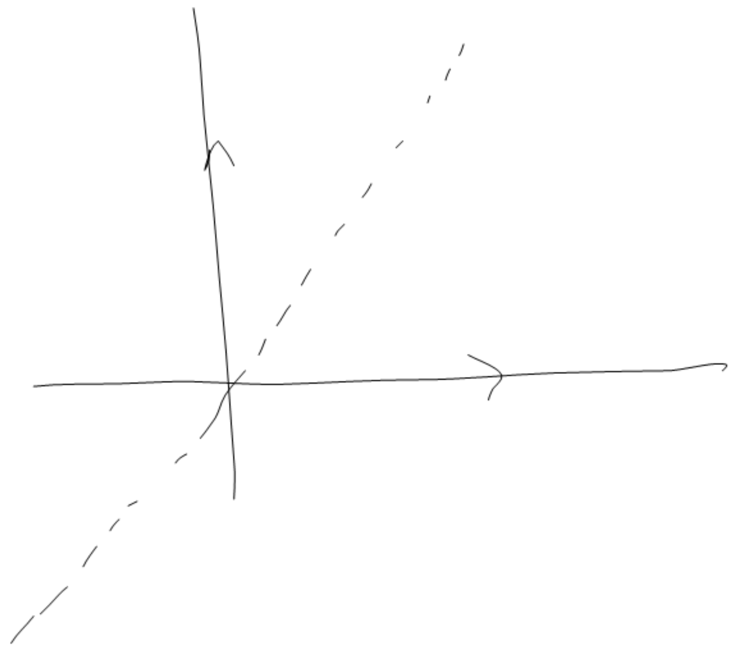


Först rotation så spegling

UT har standardmatrix

$$BA = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

Spegling om linjen $Y = X$

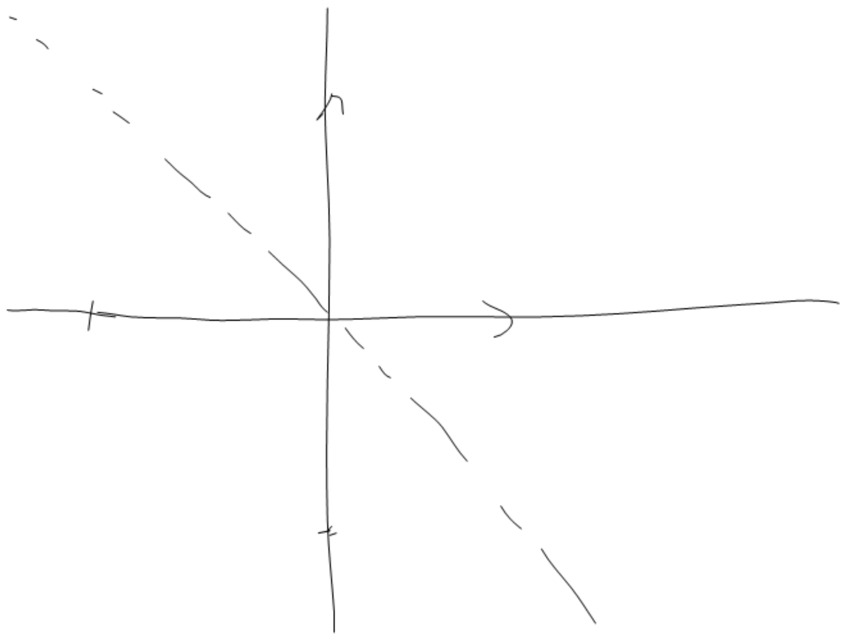


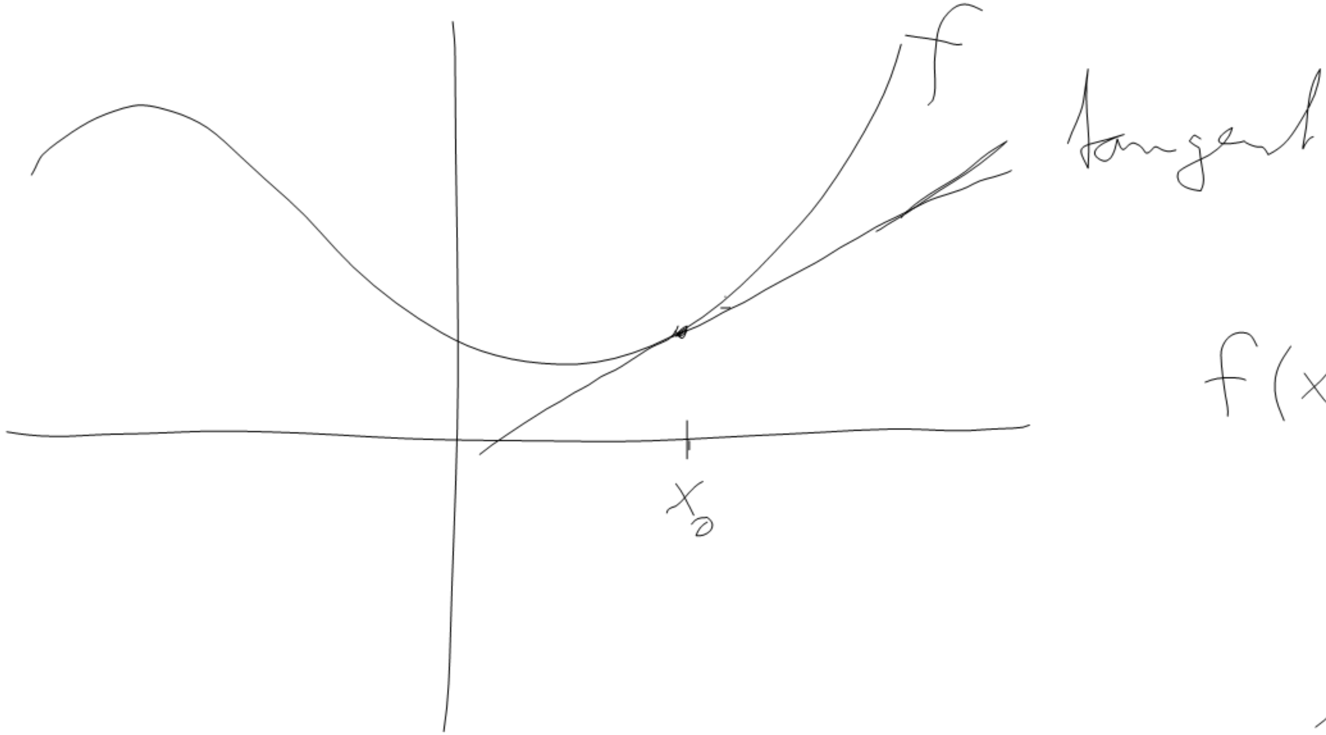
Först spegling så rotation

$TU$ har standardmatrix

$$AB = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$$

Spegling om linjen $y = -x$






$$f(x)-f(x_0) \approx f'(x_0)(x-x_0)$$
$$= T(x-x_0)$$

how T linear.